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March 2, 2016

Mr. Zi-Qiang Chen
North Carolina Department of Environmental Quality
Pre-Regulatory Landfill Unit
1646 Mail Service Center
Raleigh, North Carolina 27699-1646

Subject: Work Plan for Task Orders 687DP-1&2
Old Raleigh LF #4
Raleigh, Wake County, North Carolina
Site Identification Number: NONCD0000687

Dear Mr. Chen:

CDM Smith Inc. is pleased to submit this Work Plan and schedule for Task Orders 687DP-1&2 dated February 12, 2016. Per Task Order 687DP-1, the following activities will be completed by CDM Smith:

- The estimated waste disposal boundary will be confirmed using auger drilling techniques;
- Landfill gas measurements will be collected within the waste disposal area to evaluate aboveground vapors;
- Surface water and sediment samples will be collected from four locations along Pigeon House Branch; and
- Soil and groundwater samples will be collected from any identified seeps.

A report summarizing the tasks identified above will be completed in accordance with Task Order 687DP-2. We look forward to working with you on this project and others. If you have any questions or comments, please do not hesitate to contact me by phone at (919) 325-3569 or by email to colonemf@cdmsmith.com.

Sincerely,

A handwritten signature in blue ink that reads "Mathew F. Colone".

Mathew F. Colone, P.G.
CDM Smith Inc.



Section 1

Task Orders 687DP-1&2 Background

1.1 General

CDM Smith Inc. (CDM Smith) is pleased to submit this Work Plan for Task Orders 687DP-1&2 dated February 12, 2016. Per Task Order 687DP-1, the following will be completed by CDM Smith at the Old Raleigh LF #4 (site) located in Raleigh, Wake County, North Carolina:

- The estimated waste disposal boundary will be confirmed using auger drilling techniques;
- Landfill gas measurements will be collected within the waste disposal area to evaluate aboveground vapors;
- Surface water and sediment samples will be collected from four locations along Pigeon House Branch; and
- Soil and groundwater samples will be collected from any identified seeps.

A report summarizing the tasks identified above will be completed in accordance with Task Order 687DP-2. All field activities will be performed in accordance with CDM Smith's Standard Operating Procedures and Quality Assurance (SOPQA) manual that was approved by the Department of Environmental Quality's Division of Waste Management - Superfund Section - Inactive Hazardous Sites Branch - Pre-Regulatory Landfill Unit (Unit). The Work Plan details and schedule are provided in Section 2 and Section 3 summarizes the reporting.

1.2 Personnel

CDM Smith and subcontractor personnel engaged in intrusive field activities at the Site will comply with the Occupational Safety and Health Administration's required health and safety training for hazardous waste sites. CDM Smith personnel will monitor landfill gas (i.e. methane, oxygen, carbon dioxide, hydrogen sulfide, and volatile organic compounds (VOCs)) during drilling activities using a QRAE Plus PGM-2000 and a MiniRae 3000 photoionization detector (PID) as part of CDM Smith's site-specific Health and Safety Plan. Drilling and laboratory services will be performed by licensed or certified North Carolina subcontractors. Appendix B of the *Guidelines for Addressing Pre-Regulatory Landfills and Dumps (November 2015)* was provided to the laboratory to generate analytical costs for the Cost Estimate and to ensure that all analyses are performed within the Unit's guidelines.

1.3 Daily Recordkeeping

Records will be kept in a dedicated logbook to track the progress of field activities. CDM Smith's Project Task Manager and the Unit's Project Manager (PM) will be notified if field conditions or findings require a deviation from the Work Plan. If there are delays due to weather or other unforeseen events, the Unit's PM will be contacted and a written request for extension will be submitted.

CDM Smith will provide a daily email to the Unit's PM summarizing field activities. Conditions or findings that may cause cost overruns will be communicated immediately to the Unit's PM and work will cease

until approval is granted. Unit approved cost overruns will be followed by written correspondence from CDM Smith within 24-hours of verbal approval. The daily field notes and updates along with other means may be used by CDM Smith for invoicing, subcontractor invoice verification, cost overrun justification and billing to the Unit. As such, the logbook will include among other things:

- Travel time between the Site and the CDM Smith office located in Raleigh, North Carolina;
- Date and time spent on-site along with a summary of work performed each day;
- General weather conditions;
- Site visitors;
- Equipment calibration results;
- All field parameters collected; and
- Observations that may affect work scope or schedule.

Section 2

Task Order 687DP-1 Work Plan

Work performed by CDM Smith during this project will be under the direction of a North Carolina licensed Geologist or Professional Engineer. This Work Plan was prepared under the assumption that the Unit will coordinate access with the property owners prior to initiating remedial investigation activities. Field activities and a schedule are summarized below.

2.1 Waste Disposal Boundary Delineation

Borings B-1 through -24 will be advanced along the perimeter of the estimated waste disposal boundary as shown on **Figure 1**. Auger drilling techniques will be used to advance each boring to a maximum depth of 10 feet below ground surface (bgs) or until waste or auger refusal is encountered. Additional borings will be offset towards or away from the initial boring depending on the presence or absence of waste. The cover soil thickness at each boring location will be recorded along with a description of the type of waste encountered. PID measurements will be collected from the cover soil and top of waste.

The waste disposal boundary may extend beneath Fenton Street or Capital Boulevard. No offset borings will be completed in or beyond the right-of-way for these roads.

2.2 Aboveground Vapor Screening

The potential for aboveground vapors will be evaluated by collecting landfill gas measurements across the waste disposal area using a 25 foot grid as shown on **Figure 2**. The grid may be expanded to include additional areas based on the results of the waste delineation investigation. Measurements of methane, oxygen, carbon dioxide, and hydrogen sulfide will be collected within each grid using a Landtec GEM 2000 Plus (GEM). Total VOCs will also be measured using a PID. All measurements will be collected no more than six inches above land surface and each instrument will run for at least 30 seconds prior to recording the measurements.

Barometric pressure, ambient temperature, and humidity will be recorded hourly throughout the screening. A hygrometer will be used to measure humidity and ambient temperature and the GEM will be used to measure barometric pressure. The screening will not be performed on days where it is rainy or windy.

The GEM and PID will be field calibrated prior to initiating the screening in accordance with the manufacturer's instructions. The GEM will be calibrated using 35 percent carbon dioxide gas and 50 percent methane gas. A summary of the field calibration procedures and bump tests to verify calibration and instrument accuracy before, during, and after the screening along with the types of calibration gas and expiration dates will be recorded.

2.3 Surface Water, Sediment, and Seep Investigation

Surface water and sediment samples will be collected from SW/SED-1 through -4 located along Pigeon House Branch as shown on **Figure 3**. Samples will be collected in a downstream-to-upstream order starting with sample location SW/SED-4.

Groundwater seeps, where accessible, will be identified and sampled along the south embankment of Pigeon House Branch. In addition to groundwater samples collected from each seep, soil samples will also be collected.

Each surface water and groundwater seep sample location will be measured for pH, conductivity, temperature, and turbidity using a multi-parameter water quality meter and turbidity meter. Each water quality meter will be calibrated in accordance with the manufacturer's instructions prior to initiating sampling activities.

All samples will be analyzed for VOCs by U.S. Environmental Protection Agency (EPA) Method 8260B, 1,4-dioxane by EPA Method 8260B selective ion monitoring, semi-VOCs by EPA Method 8270D, 14 metals (i.e. antimony, arsenic, beryllium, cadmium, chromium, copper, iron, lead, manganese, nickel, selenium, silver, thallium, and zinc) by EPA Method 6020A, mercury by EPA Method 7470A (surface water/groundwater seep) and 7471B (sediment/seep soil), ammonia by Standard Method 4500, and nitrate and sulfate by EPA Method 9056A. Tentatively Identified Compounds for the largest 10 peaks identified by the 8260B and 8270D analyses will be reported for each sample. Surface water and groundwater seep samples analyzed for metals will be collected in a separate container and allowed to settle prior to decanting into the sample container if turbidity measurements are elevated (i.e. above 10 Nephelometric Turbidity Units).

2.4 Laboratory and Sampling Quality Control/Quality Assurance

Duplicate samples will be collected daily from each media during sampling activities for laboratory quality control. The duplicate samples will be analyzed for the same parameters as the primary samples. One duplicate surface water, sediment, and seep (soil and groundwater) sample will be collected.

An equipment rinsate blank will be collected from the stainless steel scoop and bowl used to collect sediment samples to verify that decontamination of the sampling equipment is achieved. Distilled water will be used to collect the rinsate blank and the samples will be analyzed for the same parameters as the surface water and groundwater seep samples. A trip blank will also be analyzed for VOCs only.

Upon collection, all samples will be labeled and placed in a chilled cooler. Standard chain-of-custody procedures will be followed to document the handling of the samples. A laboratory courier will pick up sample coolers and deliver them to the lab. Laboratory analyses will be on a standard turnaround of 10 business days. Following receipt of the analytical report from the laboratory, CDM Smith will perform a completeness check. Once all data is verified and the report is satisfactory, CDM Smith will forward the data to the Unit PM along with a completeness letter stating that the data is useable.

2.5 Utility Survey

Underground utilities will be marked by a private utility locator prior to initiating drilling activities. The utilities will be marked using ground penetrating radar and electromagnetic survey techniques.

Northing and easting coordinates will be collected from the underground utilities, waste delineation borings, and aboveground vapor screening locations with detections of hydrogen sulfide, methane, or total VOCs using a handheld Global Positioning System (GPS) unit. Additionally, GPS coordinates will be collected from the surface water and seep sample locations. All GPS coordinates will be reported in decimal degrees to the seventh order using the North American Datum of 1983 with accuracy in the thousandths of a meter following differential correction. Latitude and longitude will also be reported using the World Geodetic System 1984 format.

GPS coordinates will be collected along the entire waste disposal boundary at 50-foot intervals upon the completion of the waste disposal boundary delineation activities. The coordinates will be collected starting at the most northern point of the waste disposal boundary and will continue in a clockwise progression around the perimeter.

2.6 Site Restoration

Clearing will not be required to access the boring locations. Prior to drilling, photographs of each boring location will be taken to document pre-existing conditions. The borings will be completed in areas with grass and asphalt. Backfill for borings completed in asphalt areas will include an asphalt patch compacted to the surrounding elevation. Ruts generated during drilling activities will be graded flat and grassed areas that are damaged will be reseeded with a hay cover. Photographs will be taken of all disturbed and restored areas.

2.7 Investigative-Derived Waste

Investigative-derived waste generated during drilling activities will consist of soil cuttings and waste. Soil cuttings and waste will be deemed non-hazardous and placed back in the boring from which they came. Cover soil cuttings will be stockpiled separately from the waste cuttings to ensure the cover soil remains free of waste. Hydrated bentonite chips will be used for backfill in instances where there is not enough soil to completely backfill the boring flush with the adjacent land elevation. Spent personal protective equipment will be assumed to be non-hazardous and placed in a trash bag for disposal in a dumpster at the CDM Smith office.

2.8 Schedule

CDM Smith will schedule the utility location, drilling, and sampling activities within 3-weeks of receiving Notice to Proceed from the Unit. The schedule may be adjusted to allow time for the Unit to negotiate access with the property owners and will be based on subcontractor availability. CDM Smith will confirm the dates for this investigation with the Unit PM prior to mobilizing.

Underground utilities will be located the day before initiating drilling activities. Surface water, sediment, and seep sampling will be performed while underground utilities are being surveyed. Waste delineation activities will likely be completed in 2 days but 3 days may be required due to coordination efforts at the dealership or if the volume of offset borings requires additional time to fully delineate

the waste boundary. The geophysical survey results were inconclusive on Parcel Identification Number 1714273266 due to the subsurface lithology and limited access from the volume of vehicles at the dealership. A proposed schedule and personnel involved with each task is provided below in **Table 1**.

Table 1 – Proposed Field Activities Schedule

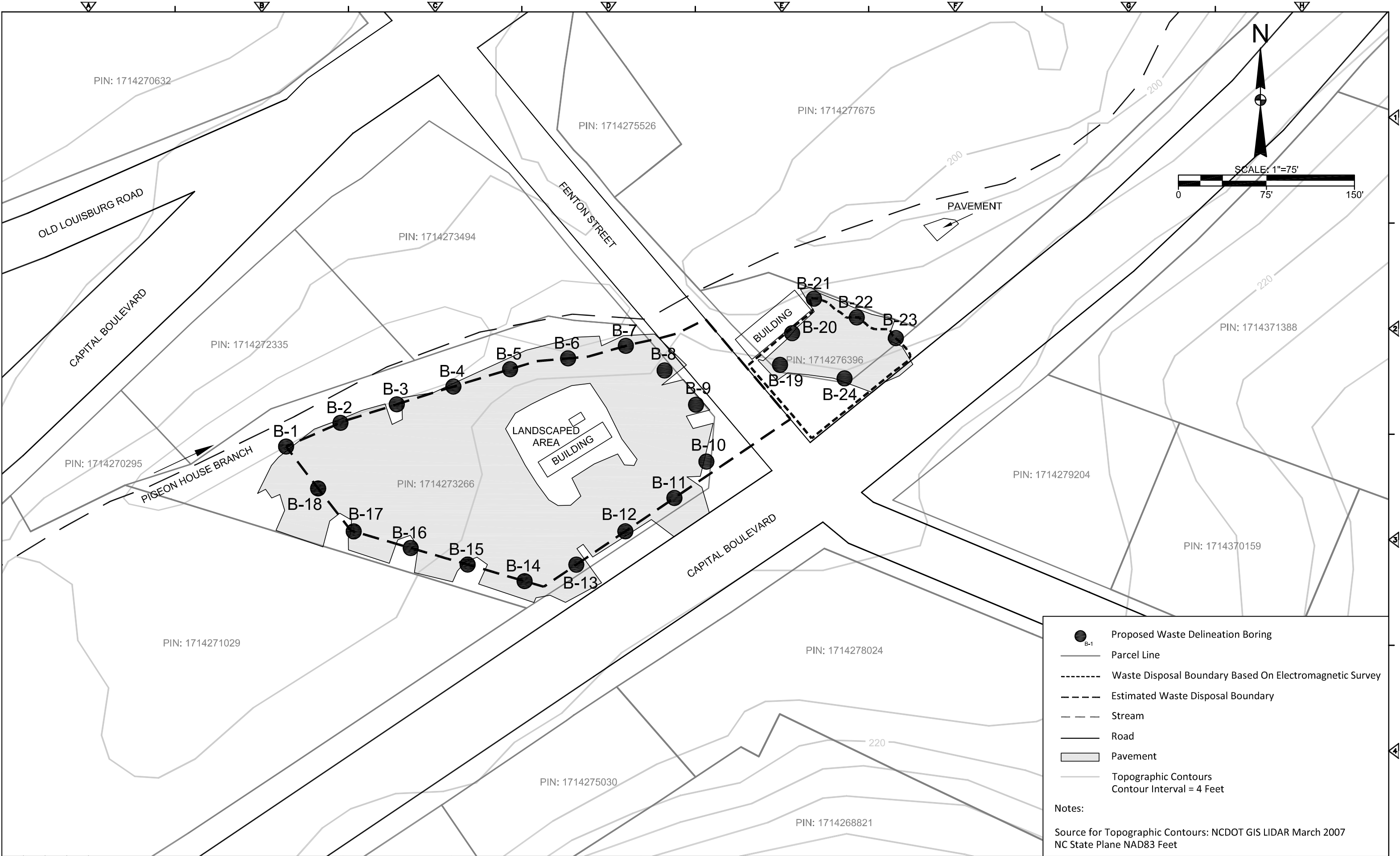
Task	Schedule	Project	Staff	Personnel	
				Technician	Subcontractor(s)
Utility Location	Day 1 – Locate and mark underground utilities at the site.	0	1	0	Yes
Waste Disposal Boundary Delineation	Day 2 – Begin advancing waste delineation borings.	0	1	0	Yes
	Day 3 – Continue or complete waste delineation activities and survey.	0	1	0	Yes
	Day 4 – Complete waste delineation activities and survey, if necessary.	0	1	0	Yes
Surface Water, Sediment, and Seep Investigation	Day 1 – Complete surface water, sediment, and seep investigation.	0	1	1	No
Aboveground Vapor Screening	Day 2 – Complete aboveground vapor screening.	0	0	1	No

Section 3

Task Order 687DP-2 Report Compilation

A draft report will be prepared following the Unit's approval of the preliminary field notes, boring logs, figures, and tables. The draft report will be titled *Remedial Investigation – Waste Disposal Boundary Delineation, Aboveground Vapor Sampling, and Surface Water/Sediment/Seep Sampling* and will include a discussion of field activities, Work Plan or SOPQA manual variances, tabulated coordinates for the waste disposal boundary, tabulated coordinates and results for all vapor screening locations, tabulated analytical results with comparison to applicable standards, site maps showing boring, surface water, seep, underground utilities, and aboveground vapor screening locations, analytical results map showing exceedances of the standards, a copy of the field notes, and certification form.

The draft report will be submitted electronically to the Unit for approval within 10 days of the Unit's approval of the preliminary data. A final copy of the report will be submitted electronically once any comments from the Unit on the draft report have been addressed, assumed to be within 5 days of receiving comments.



B-1

Proposed Waste Delineation Boring

Parcel Line

Waste Disposal Boundary Based On Electromagnetic Survey

Estimated Waste Disposal Boundary

Stream

Road

Pavement

Topographic Contours

Contour Interval = 4 Feet

Notes:

Source for Topographic Contours: NCDOT GIS LIDAR March 2007
NC State Plane NAD83 Feet

REV. NO.	DATE	DRWN	CHKD		REMARKS

DESIGNED BY: A. WEISPFENNING
DRAWN BY: A. WEISPFENNING
SHEET CHK'D BY: D. FORBES
CROSS CHK'D BY: _____
APPROVED BY: M. COLONE
DATE: FEBRUARY 2016

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RALEIGH, WAKE COUNTY, NORTH CAROLINA

OLD RALEIGH LF #4
(NONCD0000687)

PROPOSED WASTE DELINEATION BORINGS

PROJECT NO. 127844-100000
FILE NAME: FIGURE 1.DWG

FIGURE
1



REV.	DATE	DRWN	CHKD		REMARKS

DESIGNED BY: A. WEISPFENNING
DRAWN BY: A. WEISPFENNING
SHEET CHK'D BY: D. FORBES
CROSS CHK'D BY: _____
APPROVED BY: M. COLONE
DATE: FEBRUARY 2016

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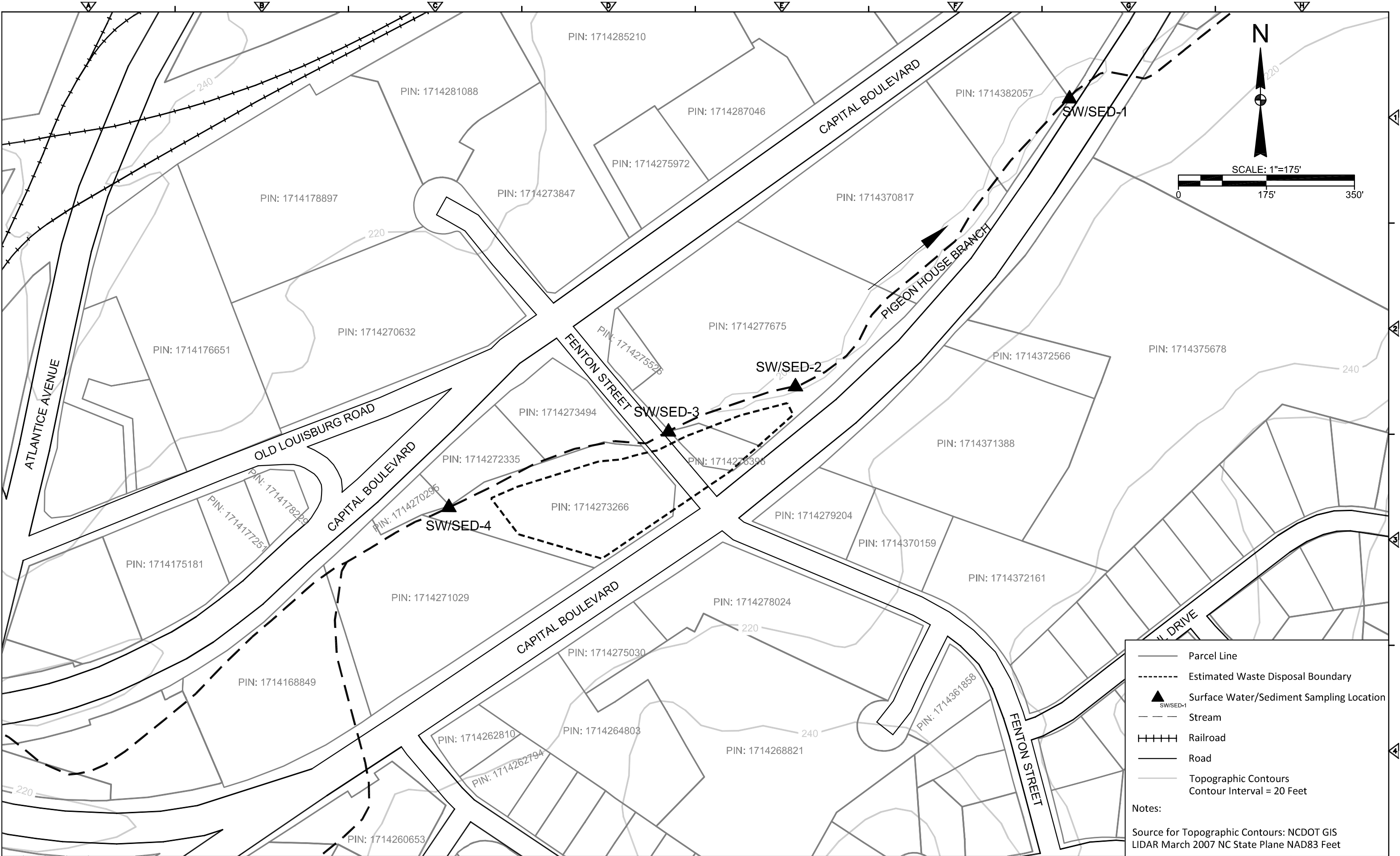
OLD RALEIGH LF #4
(NONCD0000687)

ABOVEGROUND VAPOR SCREENING LOCATIONS

PROJECT NO. 127844-100000
FILE NAME: FIGURE 2.DWG

FIGURE

2



REV.	DATE	DRWN	CHKD	REMARKS	

DESIGNED BY:	A. WEISPFENNING
DRAWN BY:	A. WEISPFENNING
SHEET CHK'D BY:	D. FORBES
CROSS CHK'D BY:	
APPROVED BY:	M. COLONE
DATE:	FEBRUARY 2016

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RALEIGH, WAKE COUNTY, NORTH CAROLINA

OLD RALEIGH LF #4
(NONCD0000687)

PROPOSED SURFACE WATER AND
SEDIMENT SAMPLING LOCATIONS

PROJECT NO. 127844-100000 FILE NAME: FIGURE 3.DWG
FIGURE 3